

Application No. 10/064,756
Attorney Docket No. 125691-2 (13591US02)

REMARKS

The present application includes claims 1-33. Claims 1-33 were rejected. By this Amendment claims 1, 14, and 25 have been amended.

Claims 1-6, 9, 10, 13, 14, 16, 17, 20, 21, 24, 25, 27, 28, and 31 were rejected under 35 U.S.C. §102(b) as being anticipated by Boyd et al., U.S. Patent No. 4,352,021.

Claims 2, 12, 15, 23, 26, and 33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Boyd et al., U.S. Patent No. 4,352,021, in view of Slack et al., U.S. Patent No. 6,393,091.

Claims 7, 8, 18, 19, 29, and 30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Boyd et al., U.S. Patent No. 4,352,021, in view of Richey et al., U.S. Patent No. 4,547,892.

Claims 11, 22, and 32 were rejected under 35 U.S.C. §103(a) as being unpatentable over Boyd et al., U.S. Patent No. 4,352,021, in view of Heuscher et al., U.S. Patent No. 6,154,516.

The Applicant now turns to the rejection of claims 1-6, 9, 10, 13, 14, 16, 17, 20, 21, 24, 25, 27, 28, and 31 under 35 U.S.C. § 102(b) as being anticipated by Boyd, U.S. Patent No. 4,352,021.

Regarding the rejection of claims 1-6, 9, 10, 14, 14, 16, 17, 20, 21, and 24, Boyd discusses a mode of triggering CT scans for the particular application of determining regional myocardial perfusion and blood flow in coronary arteries and cavities starting at Col. 5, Line 54. In this mode, as described from Col. 5, Lines 59-62 of Boyd, triggering

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of a CT scan can be based on a physiological signal as represented by an electrocardiogram. Boyd also mentions a technique for this mode at Col. 5, Lines 64-67 of skipping one heartbeat between scans in order to allow the computer one full second for each sequence.

Boyd does not, however, teach selecting two or more independently configurable trigger arrays. Boyd discusses selecting a trigger point, not a trigger array. For instance, Boyd discusses triggering from a physiological signal from the heart at Col. 5, Lines 59-62, and based on an appropriate physiological signal at Col. 6, Lines 32-33. A trigger point based on a physiological signal is not a trigger array.

Moreover, Boyd does not teach selecting two or more independently configurable trigger arrays. Quite the opposite, Boyd's method requires that a trigger point must always be the same for a given set of scans. As described in Boyd starting at Col. 5, Line 68, "The exact phase of the cardiac cycle selected for scanning is not critical as long as the timing is repeatable from beat to beat." Thus, Boyd does not teach selecting two or more independently configurable trigger arrays.

Conversely, the present independent claims 1 and 14 have been amended to recite selecting at least two independently configurable trigger arrays. Because Boyd does not teach trigger arrays, and because Boyd does not teach selecting two or more independently configurable trigger arrays, Boyd does not teach the limitations in independent claims 1 and 14.

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Consequently, independent claims 1 and 14 are respectfully submitted as allowable. Claims 2-6, 9, 10, and 13 depend from independent claim 1, and therefore are also respectfully submitted as allowable. Claims 16, 17, 20, 21, and 24 depend from independent claim 14, and therefore are also respectfully submitted as allowable.

Regarding the rejection of claims 25, 27, 28, and 31, Boyd discusses at Col. 5, Line 41-47 using a moveable gurney in order to vary the patient's body respect to the scanner axis. As further mentioned, the purpose of the moveable gurney is to image cardiac cross-sections which are transverse to the long and short axes of the heart.

Boyd does not, however, teach the automatic movement of a patient in between or during multiple scans. Rather, Boyd's moveable gurney is only for adjusting the patient before a set of scans is performed. Apparently, Boyd's moveable gurney is provided to make the patient more comfortable and to reduce patient motion when scanning sections which are transverse to the long and short axes of the heart.

Conversely, amended claim 25 recites the automatic movement of a patient with respect to the CT scanner before or during the CT scans. This limitation is not taught by Boyd.

Consequently, independent claim 25 is respectfully submitted as allowable. Also, claims 27, 28, and 31 depend from independent claim 25, and therefore are respectfully submitted as allowable.

The Applicant now turns to the rejection of claims 2, 12, 15, 23, 26, and 33 under 35 U.S.C. § 103(a) as being unpatentable over Boyd in further view of Slack, U.S. Patent

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No. 6,393,091. Slack discusses a technique for non-uniform sampling of the cardiac phase. Slack's technique is described generally from Col. 2, Line 60 through Col. 4, Line 18. This technique involves observing a patient's cardiac cycle, and then assigning a priority value to a number of potential sampling points along the patient's cardiac cycle. Then, as discussed at Col. 4, Lines 15-18, "a number of points N of highest priority are selected, where N is a number of phases desired for generating images." As further described at Col.4, Lines 19-39, once these sampling points are selected, Slack's technique repetitively uses the same selected sampling points. As mentioned at Col. 2, Lines 40-43, sampling is then performed by the data acquisition system which samples analog data from x-ray detector elements.

Slack does not teach or suggest triggering a CT scan. Indeed, Slack does not teach triggering at all. The word "trigger" cannot be found in the Slack reference.

Rather, Slack discusses a data acquisition system that samples analog data from x-ray detector elements. Slack also mentions providing a reference phase for CT scans.

However, sampling analog data at a data acquisition system, and providing a reference phase for scanning times is not the same as triggering a CT scan. Thus Slack does not teach triggering a CT scan at all.

Nor does Slack teach or suggest selecting two or more independently configurable trigger arrays. Rather, Slack discusses selecting sampling points, not trigger arrays. Moreover, Slack's sampling points are not independently configurable, because Slack's technique requires that the same set of selected sampling points are reused without

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change for every subsequent scan (for a given set of scans). Thus, Slack does not teach selecting two or more independently configurable trigger arrays.

Conversely, amended claims 1, 14, and 25 recite selecting two or more independently configurable trigger arrays. Because neither Boyd nor Slack teach or suggest these limitations, claims 1, 14, and 25 are respectfully submitted as allowable. Claims 2, 12, 15, 23, 26, and 33 depend from independent claims 1, 14, and 25 and 33 are also respectfully submitted as allowable.

The Applicant now turns to the rejection of claims 7, 8, 18, 19, 29, and 30 under 35 U.S.C. § 103(a) as being unpatentable over Boyd in further view of Richey et al., U.S. Patent No. 4,547,892. Richey discusses at Col. 3, Lines 18-20, providing a trigger by feeding the output of a QRS detector through a delay circuit. As mentioned at Col. 3, Lines 38-44, the delay circuit is adjusted based in part on a predication of when a particular cardiac phase of interest will occur in the patient's average cardiac cycle. As further discussed at Col. 3, Lines 60-61, "The ultimate objective is to synchronize the CT cardiac scanning with cardiac contractility."

Richey does not, however, teach or suggest the selection of a trigger array. Rather, Richey discusses using a specific apparatus to trigger a CT scanner. As discussed above, this apparatus consists of feeding the output of a QRS detector into delay circuit.

Nor does Richey teach or suggest selecting at least two independently configurable trigger arrays. As discussed starting at Col. 4, Line 16, Richey discusses only a need to have predictable timing from scan to scan. Reading further at Col 4, Lines

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22-29, Richey discusses discarding a scan if an observed cardiac cycle exceeds tolerance standards. It appears, therefore, that Richey maintains an initially provided trigger, and discards scans if the patient's cardiac cycle appears irregular. Thus Richey does not teach selecting at least two independently configurable trigger arrays.

Conversely, amended claims 1, 14, and 25, recite selecting two or more independently configurable trigger arrays. Claims 7, 8, 18, 19, 29, and 30 depend from independent claims 1, 14, and 25 which are respectfully submitted as allowable as discussed above. Consequently, claims 7, 8, 18, 19, 29, and 30 are also respectfully submitted as allowable.

The Applicant now turns to the rejection of claims 11, 22, and 32 under 35 U.S.C. § 103(a) as being unpatentable over Boyd in further view of Heuscher et al., U.S. Patent No. 6,154,516. Heuscher discusses using a control processor to implement a specific scan protocol starting at Col. 5, Line 61. The control processor has a lookup table with various scan protocols. As discussed starting at Col. 6, Line 45, and in FIG. 2, the first step of cardiac imaging is to initially select a particular scan protocol based on certain patient characteristics. Once a particular protocol has been selected from the lookup table, the selected protocol is maintained throughout the particular set of scans.

Heuscher further discusses a method of generating cardiac "gated" images starting at Col. 7, Line 21. As specifically discussed at Col. 7, Lines 30-36, Heuscher's suggested method requires leaving the source of radiation on throughout scanning to enable

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reconstruction of any selected phase of the heart. This continuously acquired data is later reconstructed with ECG information to produce "gated" cardiac images.

Heuscher does not teach or suggest triggering of a CT scan. Heuscher's method requires that the source of radiation remain on throughout scanning. Heuscher does not even mention the word "trigger." Rather, Heuscher discusses a method for generating "gated" cardiac images by later reconstructing the continuously acquired data. Thus, Heuscher does not teach triggering a CT scan at all.

Nor does Heuscher teach or suggest selecting at least two independently configurable trigger arrays. Rather, Heuscher mentions an initial selection of only one scanning protocol. Heuscher's scanning protocol is provided by a static lookup table, and a selected scan protocol is not changed once a particular set of scans has been initiated. Thus, Heuscher does not teach or suggest selecting at least two independently configurable trigger arrays.

Conversely, amended claims 1, 14, and 25 recite selecting two or more independently configurable trigger arrays. Claims 11, 22, and 32 depend from independent claims 1, 14, and 25 which are respectfully submitted as allowable. Consequently, claims 11, 22, and 32 are also respectfully submitted as allowable.

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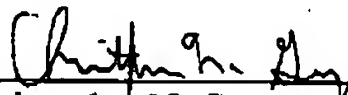
CONCLUSION

If the Examiner has any questions or the Applicant can be of any assistance, the Examiner is invited and encouraged to contact the Applicant at the number below.

The Commissioner is authorized to charge any necessary fees or credit any overpayment to the Deposit Account of GTC, Account No. 070845.

Respectfully submitted,

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